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Urban mosquitoes, situational publics, and the pursuit of interspecies separation in Dar es Salaam

A B S T R A C T

Recent work in anthropology points to the recognition of multispecies entanglements as the grounds for a more ethical politics. In this article, we examine efforts to control mosquitoes in Dar es Salaam, Tanzania, as an example of the laborious tasks of disentanglement that characterize public health interventions. The mosquito surveillance and larval elimination practices of an urban malaria control program offer an opportunity to observe how efforts to create distance between species relate to the physical and civic textures of the city. Seen in the particular context of the contemporary African metropolis, the work of public health appears less a matter of control than a commitment to constant urban maintenance and political mobilization. [*multispecies ethnography, public health, malaria, Dar es Salaam, cities*]

At 6:00 a.m., a young man arrives at the Buguruni ward office in southeast Dar es Salaam. He is one of 64 local residents known as "Community-Owned Resource Persons," or CORPs, who are paid a modest sum to find mosquito breeding habitats for the city's Urban Malaria Control Programme (UMCP). As he has every other morning this week, the CORP collects a notebook, a pencil, and reporting forms from the office of the ward supervisor, as well as a few hand-drawn maps, each representing one of the housing clusters known in the city as Ten-Cell Units (TCUs). He also takes a larvae dipper—a plastic cup attached to the end of a long wooden pole. Upon reaching the first TCU on his list, winding through dirt roads and small gardens, the CORP slows his pace and focuses his eyes on the ground. He stops at a pair of tire tracks that have filled with water and takes out one of the forms. He records the number of steps it takes him to walk around the depression in the ground and, with the handle of the dipper, measures its depth. At its deepest point, he takes a cupful of water and scans it for mosquito larvae—barely perceptible filaments hanging just below the surface. He dips a few more times, from different positions along the puddle, leaning back to prevent the shadow he casts across the water from scattering the photosensitive larvae. (See Figure 1.)

The CORP's methodical perambulations through the streets and settlements of Dar es Salaam reveal some of the essential features of urban mosquito breeding. In the fast-growing city, bodies of stagnant water are typically associated with human activity; they are seasonal, often ephemeral, appearing and disappearing with the rhythms of urban existence. The taxonomical categories featured in the CORP's reporting form—"swampy areas," "mangrove swamp," "drain/ditch," "construction pits/foundations/man-made holes," "water storage containers," "rice paddy," "matuta" (agricultural ridges and furrows), "other agriculture," "stream/river bed," "pond," "other"—barely contain the diversity

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Figure 1. UMCP entomologist and CORP searching for mosquito larvae in a septic pool in Mikocheni B, Dar es Salaam, 2008. Photo by Ann H. Kelly and Javier Lezaun.

of hollows and receptacles where water can find accommodation in the city's landscape. The epidemiological significance of these locales varies from ward to ward, street to street, season to season and, even,day to day. Their sheer transience—emerging and vanishing, like the tire tracks, with the cadences of human habitation—and the manner in which they reflect every minute change in the material fabric of the city make the encounter of human, mosquito, and parasite always imminent.

In this article, we use the range of mosquito control activities carried out in Dar es Salaam under the auspices of the UMCP to develop an anthropological perspective on the labors of interspecies separation. The mundane practices of a program so obstinately dedicated to exposing and untangling the connections that bind humans and mosquitoes provide an occasion for a provocative extension of multispecies ethnography (e.g., Kirksey and Helmreich 2010; Livingston and Puar 2011; Raffles 2010). For those, like the CORPs and the entomologists on the UMCP staff, involved in "vector control" interventions, the intimate association of humans and nonhumans is the status quo: No exemplification of "companionship" (Haraway 2008), "conviviality" (Hinchliffe and Whatmore 2006), "coexistence" (Lezaun 2011), or "ontological blurring" (Kohn 2007), however sophisticated, will add much insight into practices already saturated by the awareness of interspecies traffic. It is, rather, the difficulty of disentanglement, the introduction of a counterfactual degree of separation between humans and mosquitoes, that preoccupies these public health practitioners. And yet, observing the effort to locate and destroy larval habitats in Dar es Salaam through the lens of a multispecies ethnography offers an important analytical opportunity. The challenge could be posed as follows: Can we produce a redescription of public health interventions compatible with a new ethics of separation?

To pursue this question, we first need to characterize the imbrication of humans and mosquitoes in Dar es Salaam. Any attempt to separate these two species implies a careful assessment of the manner in which they are entangled. Here we draw insight from the anthropological notion of "domestication," understood as the process of mutual and conflictive adaptation that ensues from cohabitating in a shared built environment. Domestication, as Helen Leach has argued, describes a situation in which "the built environment of the sedentary group modifies the microclimate experienced by its occupants" (2005:353). In the case of mosquitoes and humans in Dar es Salaam, domestication does not designate a relationship of control or exploitation (Clutton-Brock 2012; Ellen and Fukui 1996) but, rather, an agonistic process of reciprocal adjustment driven by the need to inhabit a common household (Cassidy and Mullin 2007; see also Hodder 1990). Yet, as the distinctively urban itineraries of the CORP suggest, when it comes to the interactions of mosquitoes and humans, it is the city, and not the private residence, that constitutes the relevant *domus*. The urban built environment provides the most pertinent scale of cohabitation and, thus, of antimalarial intervention.

Two aspects of this urban context are central to the practices instituted by the UMCP. One is the constantly evolving topography of the urban fabric, the city as an always-changing physical reality. The other is the shifting array of political dependencies, social allegiances, and moral commitments that characterize life in Dar es Salaam. Drawing on Fustel de Coulanges's (1980:126) classic formulation, we refer to the former as "urbs," the physical locale of dwelling, and to the latter as "civitas," the system of collective identities and mutual obligations. These terms are not meant to designate an ontological distinction between two separate dimensions of urban existence. We use them, rather, to underscore the fact that efforts to extricate humans from mosquitoes in Dar es Salaam require intensified forms of attention to the material and political realities of the city. As we demonstrate below, that awareness often involves a degree of interspecies intimacy, but this intimacy is put in the service of a precarious but pragmatic spacing of species.

In our analysis of vector control practices in Dar es Salaam, then, we do not attempt to reconstruct the phenomenology of the human "mosquito worker" (Kelly 2011; Nading 2012) or to offer the mosquito another opportunity to speak (Mitchell 2002). Instead, we seek to discern a logic of relation and separation that operates at the level of the city. We begin by outlining the challenge faced by the UMCP and the practical difficulty of locating and containing a species, like *Anopheles gambiae,* so intimately intertwined with the patterns of urban life. We then use the effort to curtail mosquito breeding as a lens to explore the contemporary realities of urbs and civitas in Dar es Salaam. In our second section, we trace previous attempts to create durable separations and their influence on the physical setting of contemporary larval elimination programs. Our third section explores the intersections between the UMCP and the fluid system of political jurisdictions and dependencies that make up the civitas of Dar es Salaam, paying particular attention to the creation of structures of accountability that would ideally encompass every single square meter of the intervention area.

While the UMCP can be seen as an effort to exert control over a physical territory, the program can equally be interpreted as the dissemination of a series of embodied skills and dispositions attuned to the world of mosquitoes. The example of the "human landing catch" in our fourth section points to the forms of proximity between humans and mosquitoes that underpin the local pragmatics of separation. It also serves to remind us that the effectiveness of larval control does not extend beyond the short radius of a persistent, reiterative practice. The fragility of such a localized approach is illuminated in our fifth section by the "Muhimbili mosquitoes" episode.

We conclude by reflecting on the imaginary of the public that animates this and similar public health efforts. The work of disentangling humans and mosquitoes is ultimately an exercise in "community building," to use the UMCP's own language. Yet, as our analysis suggests, a purified and instrumental understanding of public-making hardly does justice to the contingencies that the economic, political, and material conditions of the African city impose on collective action.[1]

Unsettled malaria

To illustrate the Sisyphean nature of his task, the UMCP contact person in Mwananyamala, an administrative ward in the north of the city, points to the mountain of rubber growing behind his office. (See Figure 2.) Workers in a nearby garage have been using this plot of land to store discarded tires from the trucks and cars that pass through their shed. A static trace of human mobility, the pile of tires offers a perfect environment for mosquito breeding: warm, shaded receptacles where rainwater can accumulate for the few days the eggs need to morph into flying adults. In Mwananyamala, a densely populated area consisting largely of self-built houses and makeshift infrastructures, this habitat is only remarkable for its impertinent proximity to the offices of the municipal health care bureaucracy.

Launched in 2004 by the Dar es Salaam City Council, and benefiting from the financial and logistical support of several foreign institutions, the UMCP was conceived as a pilot project to test the efficacy and cost-effectiveness of "rational larval control" in a large, sprawling African city (Dar es Salaam City Medical Office 2004).[2] By targeting the aquatic habitats of *Anopheles* larvae, the program sought to reduce the number of mosquitoes reaching adulthood and, thus, lower the rate of malaria transmission in the city.[3] It also had to demonstrate that this reduction could be achieved in an economical manner. The cost of the protection afforded by larval control, therefore, had to compare favorably to that provided by insecticide-treated nets, the primary means of protecting humans from mosquitoes in Dar es Salaam, then estimated at $0.94 per person per year (Geissbühler et al. 2009). In addition to these concrete, quantifiable outcomes, the UMCP intended to produce a crucial political demonstration: that "larval source management," long regarded as too complex for resource-poor contexts, could be successfully implemented and sustained over time by municipal agencies and local communities.

The UMCP operated in 15 of the city's 73 wards, an area of roughly fifty-five square kilometers that included some of Dar es Salaam's most densely populated neighborhoods. In that territory, the program sought to routinize two activities: the identification of all locations where *Anopheles* mosquitoes could breed and, in three of the 15 wards, the weekly treatment of those sites with the microbial larvicide *Bacillus thuringiensis israeliensis* (Bti). In addition to

Figure 2. Pile of tires in Mwananyamala, Dar es Salaam, 2010. Photo by Ann H. Kelly and Javier Lezaun.

researchers at the Ifakara Health Institute, who conducted a series of entomological and epidemiological investigations, several dozen CORPs were recruited to carry out the bulk of the surveillance and control work. The mobilization of this local volunteer force was meant to activate a human infrastructure attuned to the peculiar scales of mosquito reproduction in the city (e.g., Geissbühler et al. 2009).

Conducting a larviciding campaign in a city like Dar es Salaam poses specific challenges. Public health experts and medical historians will argue that, all things being equal, urbanization constitutes the most effective strategy against malaria. The proliferation of smooth, hard surfaces and the relative absence of large bodies of standing water (particularly those connected with agricultural irrigation) create a comparatively inhospitable environment for mosquito reproduction (Hay et al. 2005). The problem is that, in cities, other things are hardly ever equal. The inverse relationship between the degree of urbanization and the rate of malaria incidence might hold in the long run, but it is mediated by a bewildering number of actors and factors—actors and factors that, in a city growing as quickly and in such an improvisatory fashion as Dar es Salaam, are continuously shifting and mutating.

What urbanization introduces, and what a program like the UMCP must contend with, is a more unstable balance, a more fragile equilibrium, prone to disruption by minute changes in the urban fabric or in the behavior of its human and nonhuman occupants. The epidemiology of malaria in the city is patchy and unsettled. Precisely because they typically suffer lower entomological inoculation rates (the number of infected bites they receive annually), city dwellers tend to have reduced immunity to malaria and are thus more vulnerable than rural residents to severe infection (and more likely to infect mosquitoes once they become carriers of the *Plasmodium* parasite). In Dar es Salaam, where the boundary between urban and rural populations is porous—the explosive growth of the city is fueled by immigration from its rural hinterlands—this results in a very heterogeneous distribution of immunity and transmission. Larval breeding sites may be smaller in size, fewer in number, and typically more ephemeral than those found in rural areas, but they have a much greater potential to become "focal" (cf. Brown and Kelly in press). Given its likely proximity to areas of dense human habitation, any body of standing water, however small, transient, or accidental, has a significant ability to create a dangerous intersection of humans, mosquitoes, and parasites.

The geography of malaria can thus hardly be captured by a radial geometry: The "urban fringe" can appear anywhere. Areas of the city routinely inspected by the CORPs have been targets of antimalarial campaigns since the period of German administration at the turn of the 20th century, but most of the breeding grounds are new and dynamic, appearing across the urban topography as the result of haphazard human activity. Construction sites, for instance, which punctuate the city and mark the continuous transformation of the urbs, represent some of the most intractable locales. Not only do the pits and holes excavated to lay the foundations of new buildings provide ideal conditions for mosquito breeding but they also tend to be

surrounded by fences and are thus often inaccessible to inspection (Chaki et al. 2011).

The continuous transformation of the built environment provides the backdrop to an equally incessant metamorphosis: the rapid adaptation of *Anopheles* to changes in the fabric of the city and in the behavior of its human occupants (Keiser et al. 2004). The professional entomologists in the UMCP often express wonderment at the "opportunism" of mosquitoes, particularly those of the *Anopheles gambiae* species complex, the principal vector of malaria in the city. Not only is *Anopheles gambiae* the most anthropophilic of all the species that host the malaria parasite but it is also continuously evolving to capitalize on the opportunities afforded by an urban setting.[4] In Dar es Salaam, larvae of *A. gambiae* can now be found in some of the most polluted environments in the city, such as sewage ponds or the drains of oil refineries (Sattler 2005). The ability of these larvae to thrive in unexpected environments explains the UMCP's distinctively nondiscriminatory approach: Rather than targeting the locations most productive for mosquito reproduction, the program attempted to detect and treat "all potential aquatic habitats"—every open body of water, no matter its size, duration, or location, where mosquitoes could deposit their eggs (Vanek et al. 2006; see also Kelly and Lezaun 2013).

In addition to its growing tolerance for urban pollution, *A. gambiae* is also becoming increasingly exophagic. In Dar es Salaam, it is ever more likely to feed outdoors, thereby avoiding the first (and sometimes last) line of defense against malaria, the insecticide-treated nets and other ways of "mosquito proofing" private residences (Geissbühler et al. 2007). The accelerating capacity of *A. gambiae* to seek human blood in the urban outdoors was, in fact, one of the justifications for undertaking a program like the UMCP. Protecting humans inside their homes was no longer sufficient. Reducing the incidence of malaria required that mosquitoes also be attacked in interdomiciliary spaces. The traditional distinctions between domestic and civic, private and public, have not survived the transformation of the mosquito itself into a city dweller.

Of course, in Dar es Salaam these distinctions already exert a loose grip on urban reality. Yet the general fluidity of spatial categorizations that characterizes life in the contemporary African city is compounded as soon as one factors in the trajectories of parasites and mosquitoes. If the postcolonial African city is characterized, as AbdouMaliq Simone (2004) has argued, by the proliferation of "unregulated encounters" among its human inhabitants, the versatility of its nonhuman occupants, in particular the reproductive opportunism of *Anopheles* mosquitoes, adds several measures of contingency to the distribution of risk. Rather than encompassing a stable geography of disease, the city gives rise to a multiplicity of malarial situations, temporary contexts of pathogenicity triggered by the sudden convergence of mosquito, human, and parasite.

The challenge for a program like the UMCP is, first, to reveal these intersections through minute attention to the geography of mosquito breeding and, then, to interrupt the cycle of malaria transmission by killing larvae before they become flying adults. As it scrutinizes the city in pursuit of these goals, the program builds on previous attempts to conform the urbs and the civitas to an ideal of the sanitary city—attempts that have shaped the peculiar topography of public health interventions in Dar es Salaam.

A history of surfaces and separations

The tasks undertaken by the CORPs—walking around the city in search of small accumulations of water, patiently mapping the locations of breeding sites, depositing larvicides in depressions and containers—have a long tradition in Dar es Salaam. Located in an environment ideal for mosquito habitation—land with a high water table, traversed by a large tidal creek, and exposed to a long rainy season—the city bears the traces and memories of many previous attempts to curtail mosquito breeding. As in many other colonial territories, antimalarial interventions along the East African coast often operated as mechanisms to extend control, however tenuous, over landscapes and populations (e.g., Packard 2007; Sufian 2008).

From the first German *Bauordnung* (building regulation) of 1891, the very layout of the city has reflected a desire to neutralize dangerous proximities. Like most colonial outposts in sub-Saharan Africa, Dar es Salaam was segregated along racial lines, with separate areas for the European, Asian, and African populations. This zoning was justified on sanitary grounds and had a distinctive material inflection: It was enforced by mandating different standards of construction in different sections of the city—"European type building" north of the harbor toward the Msimbazi River, houses built with solid materials (stone) in the Indian quarter, and "native huts" allowed only beyond a "neutral zone" at the western edge of the Euro-Asian urbs (Kironde Lusugga 2007).

This crude division of the urban space was complemented by a variety of engineering works. Whether it was by paving streets, using adequate slopes, installing culverts under roads, or building concrete-lined drains, colonial authorities sought to uproot mosquitoes from the urban landscape by creating a built environment that would prevent water from stagnating. The proliferation of impervious surfaces, indeed, the "surfacing" of Dar es Salaam (cf. Ingold 2008), or, at any rate, of its administrative center and European quarters, was expected to deprive mosquitoes of breeding opportunities in the proximity of the city center and thus limit the cohabitation of humans (particularly nonimmune Europeans) and *Anopheles*.

The manipulation of the city's material fabric was enhanced by measures of legal repression. The 1912 German "Ordinance for Combating Dangers Arising from the Bites of Mosquitoes," for instance, mandated that "ponds, vessels, tubs, tins, coconut shells and the like should be emptied of water at least once every four days by the owners, and that water-accumulating depressions in the grounds of property-holders be filled or kerosene poured on regularly" (Clyde 1967:13). This policy would survive the transition to British administration after World War I. The "Mosquito Rules" of 1937 offered a particularly indiscriminate version of this approach:

> The breeding of mosquitoes in any receptacle of any kind whatsoever whether natural or artificial and whether fixed or movable in which water whether of a permanent or casual nature is or may be conveyed or contained whether by design or chance and if by design for any purpose whatsoever shall be prevented by such of the measures … as may be required by notice in writing by the Sanitary Authority. [Mackay 1937:53]

These efforts to modify the urban environment and control the behavior of its occupants speak to the sort of "tropical triumphalism" that characterized many antimalarial interventions in colonial times (Sutter 2007). In the particular case of Dar es Salaam, it is important to note that these interventions were always organized through, and sustained by, systems of native labor. The specific manner in which local men and women were employed in different forms of "mosquito work" reflected shifts in colonial attitudes toward an emerging African working class. In the early years of British rule, mosquito brigades were largely composed of migrants who were unable to afford the hut tax (Scott 1963). As colonial policy shifted toward expanding the range of municipal services and cultivating a native civic consciousness, a regular force of mosquito finders was formally employed within the municipal bureaucracy (Burton 2003; Titmuss 1964).

After the country gained independence in 1961, integrated initiatives of vector control persisted in Dar es Salaam. Julius Nyerere's policies emphasized the reversal of the colonial "urban bias" in favor of rural development, but routine mosquito control continued to be a feature of municipal administration into the 1970s (Yhdego and Majura 1988; for a classic account of the broader context of this transition, see Hyden 1980). In fact, key features of larval source management—its reliance on "local intelligence" and the possibility of enrolling volunteers in the conduct of menial tasks—were consistent with the sort of grassroots mobilization that characterized many of the developmental and public health initiatives of the newly independent state.

It was only with the deepening economic crisis of the 1970s that regular larviciding operations ceased. The policies of structural adjustment adopted to secure foreign loans, combined with the process of "decentralization" implemented by the ruling TANU (Tanganyika African National Union) party (since 1977, the CCM, or Party of the Revolution), decimated the ability of state and municipal authorities to implement large-scale changes in the urban fabric or sustain long-term programs of mosquito surveillance and control (Caldas de Castro et al. 2004). Without routine maintenance of the existing infrastructure, water began to stagnate in predictable places—"antimalarial drains," now routinely clogged, became inviting locations for *Anopheles* breeding—while the termination of training programs in malaria control that followed the collapse of the East African Community in 1977 interrupted the intergenerational transmission of the relevant expertise. In 1982, for example, the youngest malaria assistant employed in urban mosquito control in Dar es Salaam was 50 years of age and eligible for retirement (Kilama 1985).

The decline of urban infrastructures and the termination of mosquito control programs coincided with a period of explosive urban growth that followed its own opportunistic patterns (Briggs and Mwamfupe 2000). The need to generate additional sources of food and income in an era of hyperinflation drove many residents to farm plots of land in urban and periurban areas, thus increasing the availability of breeding locations. Campaigns against mosquitoes—to the extent there were any—came to rely exclusively on the domestic use of insecticides. The individual household became the only relevant domus, and adulticidal measures—killing adult mosquitoes as they entered private residences—replaced interventions premised on the denial of breeding opportunities in close proximity to human habitation. Smooth public surfaces could no longer be maintained, hard-earned separations were left to erode, and humans and mosquitoes came to share the city without restrictions. (See Figure 3.)[5]

In the late 1980s, a series of vector control interventions in Dar es Salaam began to reactivate remnants of the midcentury physical and social infrastructures of mosquito control, often with foreign financial and technical assistance. Between 1987 and 1996, the Japan International Cooperation Agency (JICA) sponsored an extensive and expensive malaria control program that included the systematic registration of *Anopheles* breeding sites and the clearing of more than a hundred miles of drains. By some measures, the program was effective in reducing the prevalence of malaria in certain sections of the city, particularly among schoolchildren, but it never became a permanent feature of the local administration. JICA reports and the secondary literature on the program make repeated reference to the difficulty in obtaining and sustaining "community participation"—for instance, for intensive indoor residual spraying operations or regular drainage work. Since the turn of the 21st century, some municipalities in the city have

Figure 3. Informal sanitation infrastructure in Kurasini, Dar es Salaam, 2010. Photo by Ann H. Kelly and Javier Lezaun.

attempted to reintroduce a modest degree of larval control, typically by recruiting local volunteers to conduct surveys of mosquito habitats, clear drains, and remove bodies of stagnant water.

The contemporary UMCP is thus the heir to a long history of mosquito control efforts in Dar es Salaam. This history is alive, not only in the traces of material infrastructure left over by previous antimalarial designs, a sort of "imperial debris" of species sanitation (Stoler 2008), but also in the collective imaginaries of public health and its role in the creation of a modern metropolis. In fact, one of the most remarkable aspects of conducting an anthropology of larval control in Dar es Salaam is the vividness of the memories that actors bring to bear on their renewed efforts to extricate mosquitoes from the fabric of the city. Entomologists on the UMCP staff will discuss the fine details of the quininization campaigns carried out under German administration and can identify the exact locations of ponds drained by their predecessors decades ago; local officials carry with them long memories of the vicissitudes of previous malaria control programs (in particular, of the whims and peculiarities of their foreign partners), while residents often recount childhood experiences of participating in public campaigns against open containers and other receptacles of mosquito larvae. The figure of the CORP is itself a throwback to the self-help policies of the Nyerere era and testament to the persistent efforts to mobilize and marshal "communities" to the task of vector control. Activating the appropriate kind of memory—connecting current efforts to the right sort of past—was critical to making the UMCP appear "feasible," even if, in the meantime, the city—both urbs and civitas—had changed beyond recognition.

Accountable territories

Most of the CORPs employed by the UMCP were recruited by "street chairmen" across the neighborhoods of Dar es Salaam where the program undertook surveillance and larviciding operations. The 15 wards included in the program encompassed 67 such neighborhoods, or *mitaa* (from the Kiswahili word for "street," *Mtaa*). The Mtaa represents a "community-based" level of administration in the city, an intermediate scale of government between the official bureaucracy of municipalities and wards and the grassroots governance of the ruling CCM party's TCUs. Mtaa or "neighborhood" committees are responsible for the provision of many day-to-day services in the city—road cleaning, garbage collection, distribution of drinking water, small engineering works, and so on—as well as for the resolution of local conflicts and other public safety measures. In the words of a Mtaa leader in Kinondoni, "The Mtaa is the source of everything."[6] A significant number of CORPs were individuals who had a recognized presence locally in the activities organized by these neighborhood committees and whose main source of income was often the string of casual jobs allocated by Mtaa chairmen.[7]

One of the selling points of the UMCP for the Tanzanian government and for its foreign funders was the ability

to tap "the enormous reservoir of affordable labour that is available *in situ*" (Fillinger et al. 2008). By training a modestly paid local workforce in the principles of larval control, the UMCP hoped to activate a human infrastructure that would be able to sustain a prolonged effort against mosquito breeding. These local men and women were acquainted with the intricate topography of Dar es Salaam and could thus develop an attention to detail commensurate with the reproductive versatility of *Anopheles*. They were also expected to navigate the no less intricate politics of the city's neighborhoods and TCUs.

Each CORP employed in the identification of breeding grounds was assigned an individual area of responsibility. These territories were small enough to be traversed daily on foot (typically less than one square kilometer) and encompassed a handful of TCUs. Every TCU is headed by an elected leader, or *mjumbe,* and can encompass anything from the nominal ten to a hundred households, depending on the density of the area. Since the abolition of the one-party state in 1992, TCUs are technically party-political organs only and lack any formal role in the municipal administration. Yet they still represent the smallest unit of territorial organization in the city and, as such, offered a scale of work congruent with the distribution pattern of mosquito reproduction and with the surveying powers of the CORPs.

The remit of each CORP was to gain a detailed grasp of the territory within his or her area of responsibility. "To find **all** mosquito breeding habitats," as the UMCP staff wrote in their instructions, "you have first to **know each and every square metre** in your Mtaa" (Dar es Salaam Urban Malaria Control Programme n.d.:1; emphasis in original). Achieving such a degree of familiarity with the terrain required the support of local CCM leaders. In addition to organizing or participating in "community sensitization" meetings, where local residents were informed of the purpose and benefits of the CORPs' work, these leaders often negotiated access to private properties, especially in the case of walled compounds whose owners were reluctant to allow a stranger to conduct regular inspections. This was, indeed, a key problem for the UMCP, particularly in the more affluent sections of the city, where house ownership was more clearly established and forcefully protected. In areas like Mikocheni B or Minazini, household owners—or, rather, their guards and dogs—often barred CORPs from entering their plots, even though they were likely to contain large bodies of water. In those cases, the intermediation of local party-political leaders (or, sometimes, foreign members of the UMCP staff) was essential in securing access for local volunteers with no legal mandate to enter private premises. In contrast, in most of Dar es Salaam's "informal" settlements, surveying the places where *Anopheles* mosquitoes could breed was rarely a problem.

The support of TCU leaders was also crucial in the proper demarcation of the intervention area. When the UMCP was launched in 2004, there was no cartographic record of the city's constituent units beyond the ward level, and the low resolution of the available maps made it impossible to plot the location of individual breeding grounds accurately. The first order of business for the CORP was thus to draw a sketch map of each TCU. The CORP would delineate the exact boundaries of the TCU and identify within it every single "plot" of land as well as its owner, occupant, or main user—the person in a position to grant "unlimited and regular access" to that particular piece of territory.

To establish the boundaries of individual housing clusters, CORPs often took their first tour of each TCU in the company of its leader and of the leaders of adjacent TCUs. That way they were able to adjudicate on the spot any dispute over the exact limits of each cluster. "Explain to the 10-cell unit leaders," the CORPs were told, "that unless the boundaries [of their respective TCUs] are correctly and mutually agreed upon, mosquitoes will breed in these boundary areas and fly into the 10-cell units" (Dar es Salaam Urban Malaria Control Programme n.d.). In parts of the city that were not encompassed by any TCU—industrial tracts along the harbor in Kurasini, agricultural lands in the north of Buguruni, and a large military installation in Mikocheni, for instance—the UMCP designated new TCUs or attached these territories to existing ones, making sure that every square meter was ascribed to a specific jurisdiction (Dongus et al. 2007).

The sketch maps produced by the CORPs were filed at the appropriate ward office, and copies were brought to the offices of the Dar es Salaam City Council. Eventually, these hand-drawn maps were integrated with satellite images of the city to produce an aerial representation of all the wards, mitaa, and TCUs covered by the UMCP. Laminated color copies of these maps line the walls of the City Medical Office of Health. They represent one of the main achievements of the program: a new and more finely grained cartography of the city and its administrative and political units.

This mapping effort reveals the territorializing ambition at the heart of the UMCP. Precisely because mosquito larvae could be found virtually anywhere, the intervention area had to be mapped more exhaustively than ever before. Consciously adopting the example of other historically successful antimalarial campaigns in the tropics (William Gorgas's sanitation of *Anopheles albimanus* along the Panama Canal in the 1900s, Fred Soper's pesticide crusade against *gambiae* in northeastern Brazil in the 1930s), the UMCP sought first to elucidate—or, in some cases, redraw—civic jurisdictions and thereby create a comprehensive and contiguous spatial grid with no gaps or overlaps. It was necessary, as one member of the UMCP staff put it, "to make sure [that] there are no in-betweens."

Eliminating these in-betweens implied more than accounting for all the interstitial spaces where mosquitoes might find propitious breeding opportunities. It also

required the conjoining and stitching together of TCUs to create a complete and uniform topology of responsibility over the territory encompassed by the UMCP, to produce, in essence, a city without "no man's land." In so doing, the UMCP availed itself of constituencies with very different legal and political mandates—from the official bureaucracy of municipalities and wards to the "community-based" initiatives of the Mtaa and the TCU's party-political connections and the local recognition of their leaders. By a series of small extensions and clarifications—requesting an agreement on the boundary between adjoining TCUs, identifying an "owner" for each plot of land within the area of intervention, mobilizing the legitimacy of mjumbe and "street-level" committees to gain access to private compounds—the UMCP sought to redelineate the space of this civitas, making sure it dovetailed, as much and for as long as possible, with the physical territory of the urbs.

Not all the operations of the UMCP, however, were premised on this sort of radical territorialization of mosquito control. In some cases, the desire to track mosquitoes throughout the city required a different approach, one that relied on the physical presence of the individual human body rather than on the sort of aerial legibility afforded by maps.

Tactile proximities

A red pickup truck rolls to a halt at the edge of a floodplain. Though still in view of the Morogoro Road—one of the four traffic arteries that radiate from Dar es Salaam's downtown—the area is impassable by cars, so from here, the two UMCP Ph.D. students will go on foot. Guided by flashlights, they pick their way through the waist-high grass until they reach the hand-dug drain that marks the edge of Jangwani, a lowland along the Msimbazi River in a southwestern district of the city. Behind one of the larger compounds, they pass through a gate propped open with a stone; in the open area, a man sits on a wooden stool. Around his bare feet are half a dozen plastic cups covered with netting, which—if one listens closely—are humming. Patting the man on the back, the students check his data sheet. For the past seven hours, he has recorded the number of mosquitoes he was able to catch in a series of 45-minute intervals. The students thank him and head back to their truck. Their visit is short: They have six more surveillance CORPs to visit before dawn. The man sits back down and puts the aspirator—a rubber tube attached to a slender glass vial—back into his mouth. For the next few hours he will wait to catch mosquitoes as they land on his legs and attempt to feed.

The "human landing catch" (HLC) was one of the tools deployed by the UMCP to enhance the effectiveness of larval control. By placing CORPs around Dar es Salaam during the peak hours of mosquito feeding, the program attempted to produce an account of hourly variations in the number of females actively seeking human blood in different parts of the city. Assuming, as the entomologists directing the UMCP did, that people "are rarely bitten by vectors that have travelled more than 100 meters" (Killeen et al. 2002:625), the records collected by these stationary CORPs would alert program managers to the existence of locations requiring an intensification of larviciding efforts.[8]

The HLC is perhaps the clearest example of the radical forms of proximity and intimacy that underpin the effort to establish distances and separations between humans and mosquitoes (some of the CORPs employed in this capacity claimed to be able to tell the genus of a mosquito by its feel on their legs).[9] The fixed, attentive presence of the CORPs in the alleys and courtyards of nighttime Dar es Salaam points, moreover, to an important aspect of "mosquito work," one with a different relation to place and territory from that of the mapping effort described above: its absolute reliance on the routinization of a set of physical tasks and embodied practices.

The HLC's exquisite sensitivity to the flying and resting habits of *Anopheles* is matched by many other abilities taught in the UMCP "calibration workshops" or otherwise acquired by CORPs in the course of their work. Familiarizing oneself with the length of one's own step, for instance, was necessary to quickly measure the perimeter of a breeding site by walking around it. Adopting the proper hand gesture when depositing the larvicide granules—a motion often compared to the scattering of seeds—helped achieve the targeted coverage of one gram of Bti per square meter of water. Some of these dispositions transformed volunteers into amateur entomologists. Many of them quickly learned, for instance, to differentiate macroscopically between early and late instars or to spot the most cryptic mosquito habitats after the rains (the CORPs had been trained during the dry season).[10]

Seeing the work of larval control as an array of embodied practices sheds new light on the durability and reach of a program like the UMCP. Filip De Boeck has noted that the urbanism of the postcolonial African metropolis can be apprehended in an explicitly corporeal manner, by exploring "how the body imposes its scale and its temporal and relational logic onto the city" (2012). The watchful immobility of the HLC and other comportments routinely carried by the CORPs enact a very "personal" scale in the encounter of human and mosquito. The infrastructural significance of these practices hinges on their repetition. The work has to be carried out regularly—surveys of the territory are conducted weekly to register recent alterations in the urban fabric, larvicides must be deposited periodically to make up for their limited residual effect, regular iteration is essential to the acquisition by the CORPs of the relevant skills and dispositions. This is, in other words, a tactical practice, to borrow Ilana Feldman's description of

quotidian governing mechanisms in Gaza—reiterative, adaptable to emerging conditions, independent of long-term planning, and constrained by "limited resources and often tenuous authority" (2008:18)—but also exceedingly tactile, as epitomized by the bare legs of the HLC.

What the work of the HLCs and their fellow CORPs convey, then, is badly captured by the simplistic language of vector (or malaria) control. Very little in Dar es Salaam is under anyone's control, certainly not the alterations in the urban landscape that generate or foreclose opportunities for mosquito breeding. Changes in the physical fabric of the city and modifications in the feeding and oviposition habits of *Anopheles* are interrelated in ways and at scales that no one fully understands or can effectively influence. The repetitive practices disseminated by the UMCP are best seen, then, as a sort of "terotechnology"—from the Greek *teros,* meaning "to watch," "to observe," "to guard" (see Edgerton 2008:77; Graham and Thrift 2007)—an effort to institute a certain kind of mindfulness toward the conditions that facilitate the intersection of humans and mosquitoes in an urban context. This terotechnology takes the form of a trained awareness of the signs of change and disrepair in the fabric of the city that bring mosquito reproduction into the heart of the domus. It also entails a specific form of social vigilance, a concern with the fluid political and associational life of Dar es Salaam and with the sources of authority in a position to grant or withdraw permission to inspect the territory of the city.

Embodied by the CORPs, that attention is always contingent. Despite their designation as "resource persons," the CORPs were volunteers compensated at a daily rate (3,000 Tanzanian schillings, or $2.45), external to the municipal bureaucracy and thus enjoying none of the benefits—pension, paid leave, possibilities of advancement—associated with regular employment. At the same time, the long hours of intense labor often made employment by the UMCP incompatible with other income-earning opportunities. What prevents a surveillance CORP from skipping part of his or her area of responsibility to sell cashew nuts by the side of the road? What ensures that the HLC will stick to the allotted 15 minutes of hourly rest? This is not to suggest that a majority of these volunteers did not discharge their duties adequately, or with diligence beyond what anyone should expect, but simply to indicate the tenuous oversight that existed over the daily practices of larval control and the structural limits to a straightforwardly instrumentalist description of "mosquito work." Policing the CORPs' work beyond a few random spot checks would have made the cost of the program prohibitive. It would also have defeated the purpose of activating a self-sustaining human infrastructure of mosquito abatement.

In other words, the thoroughgoing pragmatism of the UMCP—its dedication to the political and entomological "ground game," its commitment to "practical procedures that rely on minimal technology" (Fillinger et al. 2008)—had its limits. The "fictions of rule" implicit in many governmental schemes in contemporary Africa (cf. Herbst 2000; Scott 1999, esp. pp. 223–261), and evident in the mission statement of the program, are always at the mercy of the contingencies that beset the lives of humans and mosquitoes in a rapidly changing city. It is important to remember that the UMCP was always conceived as a pilot project, of limited duration and circumscribed geographical reach, and that the funding provided by foreign sponsors was often tied to the value of the program as a scientific experiment rather than to its responsiveness to the lively sociomateriality of the street. As we discuss next, it is at the boundaries between pilot and program, experiment and policy, that the links the UMCP sought to draw between urbs and civitas began to fray.

Volatile politics

Jangwani offers a good entry point into the challenges faced by the UMCP. The area figures prominently in past accounts of antimalarial campaigns—"At Jangwani, near Dar-es-Salaam," writes H. S. Leeson of the London School of Hygiene and Tropical Medicine in a 1937 report, "larvae were found in evil-smelling swamps of yellowish water" (1937:601)—and it continues to bedevil urban mosquito control programs today. In the late 1940s, in response to discontent over the limited availability of affordable housing, the government planned to build temporary accommodation on the site. Only 79 of the promised 1,000 units were built, however, and makeshift dwellings came to fill out the urban fringe (Brennan and Burton 2007; Kironde Lusugga 1995). The living conditions in the area are abysmal, particularly after the long spring rains, when the settlement is often submerged in water and the inhabitants must move to higher ground. The Ministry for Lands and Human Settlement Development has declared the area a city park and made several attempts to relocate the population, sometimes by force. Yet, despite political pressure and habitual flooding, Jangwani remains a residential area, serviced by a network of mud and hand-dug drains that carries sewage into its multiple creeks, which swell during the rainy season and spread the waste across the settlement. (See Figure 4.)

During one of our visits to the city, in 2010, members of the UMCP and local informants were keen to discuss news of a mosquito infestation at Muhimbili National Hospital, the largest in the city, situated in the Upanga district not far from Jangwani. Apparently, the invasion had been so intense that several hospital buildings had to be evacuated, and many newspapers and radio stations carried reports of the incident. The swarm had most likely originated in the waste-clogged creeks and blocked drains of Jangwani, but some local residents saw a connection between the sudden surge in the mosquito population and the

Figure 4. Drain on the edge of Jangwani settlement, Dar es Salaam, 2010. Photo by Ann H. Kelly and Javier Lezaun.

research activities of the UMCP. Although Jangwani was not included in the program's intervention area, it was one of the locations where members of the scientific team had tested devices for the capture of adult mosquitoes, such as tent traps, resting boxes, and window exit traps. The presence of these devices shortly before the invasion was interpreted by some residents as evidence that the researchers had been releasing mosquitoes for experimental purposes.

These suspicions bring to the foreground the frail legitimacy of vector control operations in the city. The UMCP had made a conscientious effort to gain and maintain the trust of the communities within which it operated. To establish its license to operate in the streets of Dar es Salaam, the program had extended its remit beyond the location and elimination of *Anopheles* breeding grounds. The majority of mosquitoes in Dar es Salaam are members of the *Culex* genus. Culecines do not carry the malaria parasite, but they can transmit other serious diseases, such as lymphatic filariasis, and account for the largest proportion of biting in the city. The UMCP managers feared that without a significant reduction in the number of *Culex* mosquitoes "the community of the intervention wards might be disappointed because they might not feel a big reduction in nuisance biting" (Dar es Salaam Urban Malaria Control Programme 2006:8). Failure to address the *Culex* population would undermine the faith of residents in the utility of larval control and prompt opposition to the CORPs' inspection visits. To avert this scenario, the UMCP implemented a less intensive version of its control activities for habitats, such as latrines, water tanks, or soakage pits, that are unlikely to contain *Anopheles* (because they are not exposed to direct sunlight) but provide ideal locations for *Culex* larvae. Furthermore, in the 67 mitaa located within the intervention area, local households were offered small bags of larvicide (granules of *Bacillus sphaericus*) free of charge, so that they could treat their domestic containers themselves.

These policies were limited to the residential areas covered by the program. Neighboring sections of the city continued to provide propitious grounds for larvae, and following a particularly wet spring in 2010 the mosquito population in the city exploded. In response to the infestation of the Muhimbili Hospital and similar incidents in local schools, the Tanzanian government announced a radical change in the organization of mosquito control in Dar es Salaam. A team of Cuban experts arrived in the city to devise a new aerial spraying campaign that would focus on the Jangwani valley and Msimbazi creek. An agreement was signed with the government of Cuba to build a facility in Kibaha for the production of a Cuban-made larvicide—an initiative that would create several dozen jobs and eventually help replace imports from the United States. This new international alliance was heralded by the government as the beginning of a new era of antimalarial cooperation between developing countries. To others, it was just another example of the bloated aid industry, outsourcing expertise to deal with a problem best handled by Tanzanians. "What a shame," bemoaned one pundit, "Muhimbili has the biggest

concentration of PhD holders in the United Republic and they can't solve a simple drainage problem."[11]

The polemic over the "Muhimbili mosquitoes" and the recriminations and policy shifts that ensued echo past disputes in the history of Dar es Salaam over the feasibility and efficiency of different methods of larval control. It would be misleading, however, to interpret the iteration of this sort of incident as a sign of the intractability of a static problem or to read the long history of unsuccessful or prematurely terminated malaria elimination campaigns as evidence of the impossibility of uprooting mosquitoes from the city's fabric. The many interruptions and diversions in the fight against *Anopheles* should, rather, be seen as a sign of the volatility of the problem, of its sensitivity to specific material and political conditions. They are also indicative of the slippage between issues of mosquito abatement and broader imaginaries of the public good, and of the immediacy with which highly localized matters of waste disposal or larval reproduction can be connected to contrasting visions of the well-being of the nation.

Conclusion

In this article, we have taken up two tasks: first, to explore the relevance of a multispecies ethnography for the study of public health practices that attempt to disentangle intimately associated species and, second, to situate those labors of separation in the particular physical and political context of the postcolonial African city. The impetus for our analysis was a desire to develop an account of mosquito control that, while informed by current preoccupations in anthropology with the intersecting biographies of human and nonhuman creatures, is still able to accompany public health interventions in their effort to create an interval between species.

Our reading of the anthropological notion of domestication helped us chart the paths and scales of multispecies (dis)entanglement: not because the cohabitation of humans and mosquitoes in Dar es Salaam involves taming, appropriation, or control—central themes in the anthropological literature on domestication that are inapplicable to our case—but because the concept draws our attention to the role of a shared built environment—in this case, the city, understood as both urbs and civitas—in shaping human–animal connections.

Considering the city, in its physical and political dimensions, as the domus of human–mosquito cohabitation illuminates the foundational and often unexamined assumption of public health interventions: The nature of the publics brought forth the work of interspecies distancing. In a commentary on the infrastructural politics of Kinshasha, De Boeck offers an insight that captures well the aspirations of larval control programs: "Potholes or pools of water on a public road, to give but one example, may become infrastructural elements in themselves, because they create thickenings of publics, and offer the possibility of assembling people, or of slowing them down (so that one might sell something to them along the road, for example)" (2012).

A "thickening of publics" is a good way of describing the ultimate objective of the UMCP. The hope of the program was that the irregularities of the terrain, the neglect of municipal infrastructures, and, indeed, any cleavage between urbs and civitas would become the occasion for a mobilization of citizens, an assembling of local actors and interests that would produce a less malarious city. Read against the background of an always-shifting ecology of mosquito reproduction—the mosquitoes' own spontaneous assembling around potholes and pools of water—these forms of collective action represent an effort to create a measure of stability and sanitation out of the myriad intersections afforded by the African city, a process akin to what Simone describes as the "recombination of contingency" (2004:13*ff.*).

The engagement of the urban public is often couched, however, in terms of a straightforwardly instrumental communitarianism. "Communities," write members of the UMCP scientific staff, "represent the greatest and least exploited resource available for malaria control in Africa today" (Mukabana et al. 2006). Such a utilitarian understanding of communities has become de rigueur in developmental and public health initiatives across the global South (and no less so in the global North; see Amin 2005). In the case of Tanzania, it resonates with powerful national and party-political traditions. Nyerere's vision of an independent socialist Tanzania depended on grassroots popular participation to extend the administrative resources of the state (Jennings 2007; Lange 2008).

Yet these expectations of public agency impose a heavy burden on the multilayered and agonistic civitas of Dar es Salaam. The language of "community" deployed by the UMCP attributes a degree of stability to the collectives that make up the city that is at odds with the fluidity of identities and dependencies that characterizes urban life here and in other African cities (cf. Simone 2004:419; see also Dill 2010; Green 2010). The program's emphasis on the production of well-demarcated, fully accountable territories is particularly striking in this regard. The communities mobilized by the UMCP had a distinct residential bent—they were circumscribed by clear spatial boundaries (boundaries that the UMCP often took on itself to draw or clarify) and were in charge of their respective sections of territory. This delineation is problematic, however, in a city with the sort of growth and levels of migration that Dar es Salaam is currently experiencing. It also assumes a public with a high degree of consensus and conformity: The reliance on local "leaders"—at the TCU, Mtaa, or ward level—as levers for the activation of citizens betrays a hierarchical understanding of communal life. The "Muhimbili mosquitoes"

incident and its aftermath underscore the fragile legitimacy of vector control interventions and the volatilities that characterize malaria control policy in most African cities.

The publics brought forth by the UMCP were modest and transient. They were by no means powerless, but they were certainly situational, their promise always tinged with ambivalence and ephemerality. At their best, they represented "sparks of civic and political citizenship" (Amin 2005:8). They embodied a disposition to attend to the peculiarities of the urban terrain, to the intricate patterns of human–mosquito cohabitation, and a commitment to mend, in a provisional and partial manner, the many fault lines that traverse a city like Dar es Salaam. Any desire to extend the duration or reach of these publics must contend with the precariousness at the heart of the economic and political life of the city—the same precariousness that created the "reservoir of affordable labour" that made larval control a cost-effective proposition in the first place and that forced the framing of the UMCP as a limited pilot project dependent on the scientific objectives of foreign funders.

Public health always requires a certain purification of its publics: First, because it excludes nonhumans from the very definition of what constitutes a public—it defines health as the unraveling of multispecies knots—and, second, because it adheres to a particular ideal of the material and political constitution of the human community it seeks to produce—an ideal that, in the case of mosquito elimination campaigns, still owes a great deal to the sanitary imaginations of European colonial authorities.

In contrast to these grand ambitions, the actual, mundane work of urban larval control is more—for lack of a better word—conservative.[12] Its conservatism lies, first, in its endeavor to rejoin disease control with the tasks of urban maintenance—a proposition that runs against the grain of today's innovation-driven global health policy agenda. But it is also conservative in its cautious claims to progress and in its relentless capacity to test, and in some cases dispel, the "fictions of rule" that underpin many discourses on the condition of contemporary Africa, fictions about the role and reach of government, the durability of the publics mobilized to create a sanitary city, and the possibility of a final settlement in the reciprocal adjustment of humans and mosquitoes.

Notes

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1. This article draws on five years (2008–13) of ethnographic engagement with researchers at the Ifakara Health Institute in Tanzania. Our fieldwork was based on discussions with the UMCP scientific staff, close observation of the work of the CORPs, and interviews with ward supervisors, local leaders, and officials in different departments of the municipal administration. The fieldwork had a collaborative dimension, which included the supervision of Ph.D. students and the writing of several scientific papers with UMCP researchers.

2. At different stages of its execution, the UMCP received financial support from the Wellcome Trust, the Swiss Tropical and Public Health Institute, the Bill and Melinda Gates Foundation, and USAID as well as Valent Biosciences Corporation, the supplier of the microbial larvicide that was used in the intervention.

3. When the program was launched, local health facilities in the city were reporting over a million cases of malaria annually. While this incidence rate is by all accounts the result of overreporting, plasmodial infections are clearly a significant source of disease and disability in the city. In 2003, the Tanzanian government estimated that malaria was directly responsible for 100,000–125,000 deaths annually in the country, with the mortality disproportionately affecting children under the age of five and pregnant women (Ministry of Health, United Republic of Tanzania 2003).

4. In the eccentric classification of urban mosquitoes proposed by Mattingly (1963), the category that best describes the position of *A. gambiae* in Dar es Salaam is that of *colonizer*: "the mosquito which not only invades or infiltrates the town but adapts to it, exploits and turns its peculiar characteristics to its own advantage" (Mattingly 1963:136).

5. According to some estimates, the number of *Anopheles* mosquitoes in Dar es Salaam increased tenfold between the early 1970s and the early 1980s (Mwaluko et al. 1991:122).

6. Although it is not part of the "official" administration of Dar es Salaam, which includes the Dar es Salaam City Council, the three municipalities of Temeke, Ilala, and Kinondoni, and the subdivision of each of those municipalities into twenty or so wards, to describe the Mtaa as an "informal" level of governance would be misleading. Mtaa committees must be "endorsed" by ward and municipality officials to become effective policy actors. What the Mtaa reflects is, rather, the limited use of the distinction between "formal" and "informal" when it comes to describing local administrative procedures and decision-making bodies in Tanzania, where the structures of the ruling CCM party are still intimately interspersed across state and local institutions (Kyessi 2002; see also Tripp 1997).

7. On average, CORPs that had been recruited by neighborhood committees were able to identify a higher proportion of the breeding grounds in their areas of responsibility than volunteers recruited directly by UMCP staff (Chaki et al. 2011).

8. The instrumentalization of the human body as sentinel (and bait) in mosquito surveillance operations has a long tradition in medical entomology (Kelly 2012, 2013).

9. The "inter-patience" or "mutual suspension of action, a ceasefire of sorts" that Matei Candea (2010:249) finds at the heart of meerkat research also performs a critical function in the context of entomological research and antimalarial interventions, where a hasty effort to eradicate a species—via generalized DDT spraying, say, or through poorly understood chemical prophylaxis—leads to new forms of resistance and the further entrenching of perilous forms of contact.

10. This appreciation for the nuances of mosquito behavior resembles the sort of "ecological aesthetic" that Alex Nading (2012) describes in his study of mosquito control practices in Nicaragua.

11. Lole Gwakisa, JamiiForum, "SHAME!!: Cuban Doctors to help Dar in fight Jangwani Mosquitoes!!!" September 16, 2010.

12. We use the term *conservative* cautiously, and in the spirit of Andrew Barry's (2013) reading of Isabelle Stenger's (2000) cosmopolitics as a "conservative form of radicalism"—an effort to sensitize rather than expand the political domain to particular materials and situations.

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